REMARKS

Claim 1 has been amended to more particularly define applicant's claimed invention. Basis for the amendment of claim 1 can be found at page 8, lines 4-8 of Applicant's specification. Claim 21 has been added to more particularly define applicant's claimed invention. Basis for the addition of claim 21 can be found at page 9, lines 3-10 of Applicant's specification. Claim 9 has been amended as suggested by the Examiner.

The restriction requirement under 35 U.S.C. 121 is respectfully traversed. Applicant affirms the provisional election of the method of claims 1-13 (Group I).

Clearly, there is a disclosed relationship between Applicant's claimed method of claims 1-13 (Group I) and the coated article of claims 14-20 (Group II). Indeed, the coated articles of Group II are produced by the method of Group I. Applicants submit that the search and examination of all claims in the instant application can be made without serious burden to the Examiner.

As used in 35 U.S.C. 121, the term "independent" (i.e., not dependent) means that there is no disclosed relationship between two or more of the subjects disclosed, that is, they are unconnected in design, operation or effect. See MPEP 802.01. Clearly, there is a disclosed relationship between Applicants' claimed method of Group I and the claimed coated articles of Group II as indicated above.

MPEP 803 provides that if it is demonstrated that two or more claimed inventions have a disclosed relationship (i.e., dependent), then a showing of distinctness is required to substantiate a restriction requirement. As used in 35 U.S.C. 121, the term distinct means that two or more subjects as disclosed are related but are capable of separate manufacture, use or sale as claimed, and are patentable (novel and unobvious) over each other (though they may each be unpatentable because of the prior art). In view of the fact that the coated articles of Group II are produced by the method of Group I, it is submitted that a showing of distinctness cannot be made by the Examiner. MPEP 803 further provides that

where inventions are neither independent nor distinct, one from the other, or they are not sufficiently different to support more than one patent, their joinder in a single application must be permitted. Accordingly, it is submitted that the restriction requirement is improper and should be withdrawn.

The rejection of claims 1-6 and 9-11 under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al. (US 5,738,281) in view of Nowotarski et al. (US 5,486,383) is respectfully traversed.

At the outset, Applicant directs the Examiner's attention to the instant claims which provide a unique method of thermally spraying materials (not sensitive to oxidation or nitridation) by using a gas shield to produce a coating with a desired microstructure using an extended standoff that is at least 20% longer than the standoff of the thermal spray without a gas shield producing the same microstructure. Applicant's claimed invention is particularly useful for controlling the desired microstructure of a coating (not sensitive to oxidation or nitridation) of components with a complex shape using the shielded thermal spray at an extended standoff. The standoff distance between the surface of the substrate and the exit end of a shielded thermal spray device is at least 20% longer than the standoff distance of a non-shielded thermal spray device and the shielded device producing a microstructure coated layer similar or identical to a microstructure coating that would be produced using the smaller standoff of the non-shielded device.

As discussed below with respect to the cited references, gas shields known in the art are used to prevent or reduce the oxidation of reactive materials such as metals during deposition. It would be thought by those skilled in the art to be nonsensical to use such a shield when spraying a material not sensitive to oxidation or nitridation as claimed by Applicant. Applicant has found, however, that there are additional benefits to be gained using such a shield. Applicant has been discovered that when using such a shield the temperature of the thermal

spray effluent is substantially higher close to the thermal spray device and the rate of temperature decline with distance from the device is substantially lower; i.e., the effluent temperature remains high for a longer distance.

Moreover, Applicant has discovered that the temperature effect is sensitive to the flow rate of the shield gas, and that, surprisingly, it does not continuously increase with increasing flow rate, but that there is an optimum flow rate. This effect would not be expected by one skilled in the art. This is illustrated for a particular plasma spray torch using argon shield gas in Example 1 of Applicant's specification.

Surprisingly, Applicant has discovered that by using a gas shield when thermally spraying a high melting material not sensitive to oxidation or nitridation such as ceramic or nonreactive materials such as oxides, but also including nitrides, carbides, and other ceramic and nonreactive materials, that the standoff can be extended without degradation of the microstructure or other properties of the coating. Coatings with a higher density, higher deposition efficiency, higher deposition rate, and more uniform microstructure can be achieved at the extended standoff. These type of coatings would be expected to have greater wear resistance, erosion resistance, higher bond strength, and other desirable properties.

These effects are thought to be due to the increased and extended temperature effect due to the shield on the thermal spray effluent. The efficacy of this discovery is illustrated in Example 2 of Applicant's specification using zirconium oxide. It was shown that the microstructures required for thermal barrier coatings could be obtained at significantly longer standoffs with a shield than without. Moreover, at a given standoff, the microstructures were more uniform, the coatings denser, and the deposition efficiency higher with a shield than without.

The primary reference, Zurecki et al., discloses the use of a shrouding gas to combine with and protect a turbulent gas jet issuing from an orifice to enable

control of a gas jet stream composition downstream from the orifice. The natural aspiration rate of the gas jet is used by Zurecki et al. to determine the flowrate of shrouding gas which is introduced around the gas jet in a soft gas cushion which does not disrupt the flow pattern of the gas jet but instead is entrained into the jet stream to the exclusion of ambient gases in the atmosphere. Zurecki et al. uses the shrouding gas to protect the jet spray from reaction with ambient gases, e.g., reduce the amount of oxygen aspirated into the jet spray, and to protect an applied coating from oxidation by entrained air. See, for example, column 3, lines 46-50 and column 4, lines 15-25.

Nowhere does Zurecki et al. disclose or suggest the use of a shrouding gas in thermal spraying a material not sensitive to oxidation or nitridation, or that the standoff distance can be lengthened as provided by Applicant's claimed invention, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating.

The secondary reference, Nowotarski et al., adds nothing to make up for the deficiencies of Zurecki et al. as a primary reference. As noted by the Examiner in the Office Action, Nowotarski et al. discloses the use of a shielding fluid to minimize oxidation, contamination or degradation of coating materials in the turbulent flow stream. See, for example, column 4, lines 20-35.

As with Zurecki et al., nowhere does Nowotarski et al. disclose or suggest the use of a shrouding gas in thermal spraying a material not sensitive to oxidation or nitridation, or that the standoff distance can be lengthened as provided by Applicant's claimed invention, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating.

Applicants submit that alleged obviousness of the instantly claimed invention must be predicated on something more than it would have been obvious

to try using a shrouding gas in thermal spraying a material not sensitive to oxidation or nitridation or to try lengthening the standoff distance without degradation of the microstructure or other properties of a coating, to arrive at Applicants' claimed thermal spraying method or the possibility that such a particularly defined method for lengthening the standoff, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating, would have been considered in the future, having been neglected in the past. See Ex parte Argabright et al. 161 USPQ 703. It is submitted that "obvious to try" is not a valid test of patentability, and patentability determinations based on that as a test are contrary to statute. See In re Mercier 515 F2d 1161, 185 USPQ 774; In re Antonie 559 F2d 618, 195 USPQ 6; In re Goodwin et al. 576 F2d 375, 198 USPQ 1; and In re Tomlinson et al. 363 F2d 928, 150 USPQ 623.

Clearly, it is only by hindsight that the Examiner could impute to the shrouding gas used to protect the jet spray from oxidation of Zurecki et al. and Nowotarski et al., a shield gas used with a jet spray material not sensitive to oxidation or nitridation, to obtain a lengthened standoff distance without degradation of the microstructure or other properties of the coating, and thereby arrive at the instantly claimed method, and such hindsight obviousness after the invention has been made is not the proper test. See In re Carroll 601 F2d 1184, 202 USPQ 571.

In view of the amendment of independent claim 1 and the above arguments, this rejection is deemed improper and should be withdrawn.

The rejection of claims 7, 8, 12 and 13 under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al. (US 5,738,281) in view of Nowotarski et al. (US 5,486,383) and further in view of the admitted state of the prior art is respectfully traversed.

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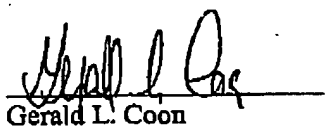
The primary reference Zurecki et al. and secondary reference Nowotarski et al. are discussed above. Both Zurecki et al. and Nowotarski et al. are silent with respect to the use of a shrouding gas in thermal spraying a material not sensitive to oxidation or nitridation, and that the standoff distance can be lengthened as provided by Applicant's claimed invention, thereby permitting the application of thermal spray coatings on complex shapes such as turbine blades and vanes, without degradation of the microstructure or other properties of the coating, as discovered by Applicants.

In view of the amendment of independent claim 1 and the above arguments, this rejection is deemed improper and should be withdrawn.

It is respectfully submitted that the rejections of record are improper and that the application is in condition for allowance. Accordingly, reconsideration and allowance of all claims are courteously solicited.

A response to the Office Action mailed November 1, 2004 was due February 1, 2005. Accordingly, submitted herewith is a petition for an extension of time for three (3) months. Please charge fees/surcharge which may be required by this paper, or credit any overpayment, to Deposit Account No. 16-2440.

Respectfully submitted,



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